

accuracy, his power and fulness, elevating all he touched, returning to the astonished inventor his discovery developed and fertilised, sowing broadcast his ideas, and rejoicing when others, friends or foes, were enriched by the precious fruits of his genius. As a scientific historian he excelled Condorcet, equalled Cuvier and Fontenelle, and was characterised above all others by his eagerness to give every one his due, and his jealous love of justice. As an orator he carried into the tribune the vigour and clearness of the scientific chair, vivified by the emotions of master-spirits, and dominating the assembly by his lofty stature, with his beautiful Southern head, and his eye full of fire. He was a man, in fact, in whom the will to act was united with the consciousness of power, an intelligence marvellously comprehensive and powerfully creative, so bold and yet so prudent at times that it never committed an error that required to be retracted. Of an ardent but loyal nature, ready for power, but incapable of hatred, and thirsting for justice, a heart sensitive and valiant, sometimes drawn, says a contemporary, to show itself severe to the strong in order to support the weak; a soul austere but a brow serene; a father and citizen worthy of the ancient legends, and able, like Carnot on quitting life to bear the noble witness: — 'My hands are clean and my heart pure.' From the extent of the sketch you may judge what will be the nature of the picture."

PALÆOZOIC ROCKS IN SOUTH-EAST OF ENGLAND¹

IN a communication to the Geological Section of the meeting of the British Association at Plymouth in 1878, I called attention to the significance of the result of the deep boring at Messrs. Meux's; as to the upper Devonian beds there met with next beneath the cretaceous strata; also as to the importance of some further knowledge as to the direction of the dip of the said upper Devonian beds. An accurate acquaintance with this point is essentially needed with reference to its immediate bearing on a question which may possibly become one of national importance, namely, the place of the true coal measure series beneath our south-eastern area, and which must serve as an excuse for another short communication on the same subject.

The question involved has attracted the attention of sundry foreign geologists during the past year, and upon our own area facts have been ascertained which now enable us to arrive inferentially at what, but a year since, was mere speculation.

M. Dewalque, at a recent meeting of the Belgian Geological Society, remarked first on the absence of Jurassic and Triassic deposits, as along the palæozoic ridge extending from the Ardennes by the north of France, being just what the borings at St. Trond, Laecken, Menin, and Ostende would indicate. Secondly, that inasmuch as the palæozoic formations of Belgium and the north-west of France are extended into England, it is an important point, with reference to the prolongation of the Belgian coal-basin, that London should be known to be situated immediately over a formation, which is itself so close to the coal measures. "The supposition that the dip of these upper Devonian beds is to the south, and that they belong to the extension of our northern basin is that which is the most probable. The coal formation may therefore occur at a short distance south of London, and at a workable depth.

"With a southern dip it may be that these beds (upper Devonian) belong to the extension of our southern basin. In this case coal may occur in the north as well as in the south, and nearer on this side (north) than on the south. Should there be such a coal basin, it might be as useless as ours (Belgium) of the Condros and the Entre Sambre and Meuse." The exact significance of this latter alternative of the Belgian geologist may not, perhaps, be understood by English geologists generally, as it has reference to a feature in the physical structure of Belgium, but the which is very properly referred to by M. Dewalque, now that the palæozoic band of the Continent is known to reach our south-east district. The band of Belgian and North of France coal-measures may be truly represented as trough-shaped, however produced.

M. Dewalque adds: "Starting from the supposition that our (Belgian) old strata are prolonged westward into England, and from the fact that upper Devonian strata occur under London, we are led to admit that the band of Silurian slates of the

Ostende boring must pass north of London. These slates must be separated from the upper Devonian by other beds, such as the black slates of the Menin Shaft, which are Silurian. Considering the geographical position of these three places, together with the east and west direction of our older formations, it would not seem that their prolongation into England would carry them sufficiently north of London, so that the Devonian beds there should represent our Condros basin, and not that of Namur. If, then, at that place (London) we are in a prolongation of the Namur basin, the strata at Meux's must dip south; consequently it is most probable that the coal-measures are to be found at a short distance south."

Such were the inferences drawn by M. Dewalque in 1878, from the results of the boring at Messrs. Meux's.

The supposition that the Silurian strata met with at Ostende would in their course westwards run north of London have been proved by the occurrence of beds of Wenlock age at Ware, near Hertford, twenty miles north of London. This discovery has come most opportunely to supply the information which only a year since was needed, as to the dip of the upper Devonian strata at Messrs. Meux's brewery. The succession of the palæozoic strata in this the English side of the channel, even into the far west, is just what it is in Belgium and the north of France, from Brussels and Ostende from north to south. There the successive members of the series mostly rise to the surface and are exposed in all the valley of denudation extending north from the line of the coal measures, as long since laid down by Dumont.

With this guidance, and in spite of the little as yet known with respect to our own underground structure on the south-east, it can be safely put in relation with what obtains on the European continent for an extent of 400 miles; the order in which the successive members of the palæozoic series rise to the surface from beneath one another there, may be taken as our guide on to the order and relation of the upper Devonian at the end of Tottenham Court Road near Oxford Street, and the section at Ware.

The question of the strike and direction of the dip of the beds at Messrs. Meux's is now determined as forming part of the northern band of the trough containing first, the mountain limestone series, and, next above, the true coal measures.

For practical guidance one point alone remains to be considered: from the place of the Upper Devonian strata in the heart of London, what must be allowed for the breadth of the outcrop of mountain limestone series next in sequence? In parts of Belgium the mountain limestone has been estimated at 600 feet thick; it is less than that in an east and west direction. The nearest place to London at which this is exposed is in the north of the Boulonnais denudation; where, with its associated beds, it may be put at 400 feet. The breadth of such a mass at its outcrop, and with an angle of 30° to 35°, such as the Devonian bed at Meux's had, would be nearly doubled, or about 800 feet; in other words the lower members of the coal measure formation may be fairly expected to occur at about that distance south from a corner of Tottenham Court Road and Oxford Street. The upper, or productive coal-measures, still further to the south.

What has been ascertained beyond all doubt as to the line of section underlying a part of our English area from London to Ware, may safely be taken as holding good for a great extent of country on the east as in the west. The ages of more modern overlying formations do not affect this question, as is shown by the borings now in England, but more abundantly in the European continent. In our attempts to trace accurately hidden physical arrangements of the earth's crust, the restrictions to be observed are—the positive data of the ascertained thickness of the several formations and their several positions, and which enable us to replace, without much chance of error, the line of each band and of its angle of dip.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

UNIVERSITY COLLEGE, BRISTOL, will shortly commence its fourth Session. The calendar, which is before us, states that there were 448 students in the college in the second session; and in the third, 576, of whom 355 were men and 221 women; 172 came in the day-time and 404 in the evening. Good progress is being made by the Engineering Department, which is designed to afford a thorough scientific education for students intending to become mechanical or civil engineers, surveyors, or architects. The course for engineering is such that students can pursue it during the six winter months of each year, and the council of the

¹ "Further Evidence on the Range of the Palæozoic Rocks beneath the South-East of England," by R. A. C. Godwin-Austen, F.R.S. Paper read at the Sheffield meeting of the British Association.

college have arranged with the leading civil and manufacturing engineers in the neighbourhood to receive in their offices and workshops during the summer months, students whose position relatively to the firms would be that of articulated pupils. Many of the recent developments in the scheme of instruction in the college are designed to meet the wants of the department. There are in addition general courses in Chemistry, Mathematics, Mechanics, Engineering, Experimental Physics, Surveying, Geometrical Drawing, Geology, Botany, Political Economy, Logic, Law, Modern History, English Literature, Greek, Latin, Ancient History and Literature, French and German. There are evening classes at low fees in most of these subjects. The college is also giving, with the co-operation of the Company of Clothworkers, instruction at Stroud in Chemistry and the Textile Industries. The subject of Logic has been added to the curriculum this year, and lectures on it will be given by Prof. Fanshawe, Fellow of New College, Oxford, who has recently been elected to the post of Classical Professor. The opening lecture of the session is to be given by him on Monday, October 6th, on "The Conditions of Intellectual Progress."

A PRIVATE society under the presidency of Dr. Kummer, Federal Director of the Statistical Board, and which already numbers 200 members, is about to open at Bern a permanent exhibition of educational objects. The exhibition comprises a collection of plans of schools, and of objects for teaching which may be considered as models for schools; a collection of publications (text-books, manuals, &c.), a collection of laws and regulations concerning schools, as well as of reports and school statistics published in Switzerland and elsewhere, and a collection representing the modes of teaching introduced in Swiss schools of all degrees, from Kindergarten to lyceums and universities. Numerous objects from the Swiss cantons and foreign countries have already arrived, and the exhibition will be opened for the public on October 15.

WE learn from the annual report of the University at Odessa, just appeared, that the university numbered 325 students and thirty-nine professors.

SCIENTIFIC SERIALS

THE *Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien* (1878, part ii., and 1879, part i.), contain the following papers:—On the shrub-lichens of Lower Austria; a catalogue of all the species observed in this province, by J. Eman Hibschi.—Mycological researches, by Steph. Schulzer von Müggenburg (3rd paper).—On the diptera-genera *Argyra macq.* and *Leucostola lev.*, by Ferdinand Kowarz.—Account of a coleopterological excursion through Carinthia, and Styria, undertaken during the summer of 1878, by Ludwig Miller.—On *Thysa pythouissa formis*, Kempelen, by Otto Hermann.—On *Amphipogon spectrum*, Whbl., and its position in systematic zoology, by Josef Mik.—On a method for drying freshly collected insects, by Brunner von Wattenwyl.—Review of the arachnida collected by Dr. Otto Finsch in Western Siberia, by Dr. L. Koch.—Bibliographica ornithologica, by Victor von Tschusi Schmidhoffen. This forms a complete catalogue of the whole ornithological literature of the Austro-Hungarian Empire.—On a copious appearance of centipedes, by Josef Paszlavsky.—Researches on zeolidiadae, by Dr. Rudolph Bergh (6th paper).—On the systematics of psyllodae, by Dr. Franz Löw.—New researches on the fungus-flora of Vienna, by Felix von Thümen, and Wilhelm Voss.—Dipterological notes, by Josef Mik. These papers contain a treatise on *Trochobola casarea*, O. S., on *Cyrtopogon meyer dirrii*, Mik., and on *Hypocharassus gladiator* the latter being a new species of dolichopodidae from North America.—On the comparative flora of Wisconsin (2nd supplement), by Th. A. Bruhin.—Researches on the ant-fauna of Asia, by Dr. Gustav Mayr.—On the cultivation of bathing sponges, by Dr. Emil von Marenzeller.—On the history of evolution of the prothallium of *Scolopendrium*, by Dr. Günther Beck.—Researches on the literature and distribution of *Hepatica* in Bohemia, by Jos. Dedecek.—Coleopterological results of an excursion to Croatia and Slavonia, by Edmund Reitter, Dr. Eppelsheim, and Dr. von Heyden.—Synonymical observations referring to Bolivar's "Catalogus Orthopterorum Europae," by Dr. Hermann Krauss.—Researches on two *Pemphigus* species, by Dr. Franz Löw.—Classification tables of European Coleoptera, (first paper containing *Cucujidae*,

Telmatothilidae, *Tritomidae*, *Mycetidae*, *Endomychidae*, *Lycidae*, and *Sphindidae*.—On the first stages of two turnip flies, (1) the metamorphosis of *Lonchaea chorea* Meigen, (2) the turnip fly *Anthonomyia conformis*, Nödlinger.—Zoological account of the expedition to Western Siberia in 1876, undertaken by order of the Bremen Society for North Polar Expeditions, by Dr. Otto Finsch, Dr. A. Brehm and Count Karl von Waldburg-Zeil-Trauchburg. This elaborate paper treats of the mammals, birds, amphibia and fishes of Western Siberia.—On some new American spiders, by Count Eugen Keyserling.—Lichenological excursions in the Tyrol (20th chapter, Prendazzo), by Dr. F. Arnold.—On some new Tyrolese *Sphegidae*, by Franz Friedrich Kohl.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, September 22.—M. Daubrée in the chair.—The following papers were read:—On evolution in medicine, by M. Sedillot. The sagacious character of the Hippocratic ideas is demonstrated by the evolution of modern medicine.—Influence of atmospheric electricity on the growth, flowering, and fructification of plants, by M. Naudin. M. Grandea, from experiments with tobacco and maize, affirmed florescence and fructification to be retarded and impoverished by withdrawal of plants from atmospheric electricity (by means of iron for wooden cages placed over them, the proximity of trees, or other bodies attracting atmospheric electricity). M. Naudin, from an extension of such experiments, thinks the influence of atmospheric electricity on plants is complex and far from being understood as yet. It is probably modified first by the nature of the plant species, then by climate, season, temperature, degree of light, dry or wet weather, perhaps, too, by the geological structure or mineralogical composition of the soil, whose layers do not equally conduct electricity. Possibly, too, tree species do not all withdraw the electric influence in the same degree.—Theoretical essay on the law of Dulong and Petit; case of perfect gases, by M. Willotte.—A work by MM. Franchet and Savatier, on the plants of Japan, was presented. It gives nearly 3,000 species, about one-fourth of which have not before been indicated in that country, and more than 200 of which are absolutely new. The work is made available for naturalists of the country by means of a table of Japanese synonyms.—On the organisation and classification of the Orthonectida, by M. Giard.—Meteorological observations at Montsouris Observatory in August (table).

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